CLMPTO
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1. A bandwidth control device for a network switch having a plurality of client ports and at least one uplink port to switch packets among the client ports and the uplink port, each client port having a predefined bandwidth threshold, the bandwidth control device comprising:

a first multiplier for multiplying a traffic rate TrΔ[n] of a client port in a time slot n by a first multiplicator g (g<1), where the time slot n is defined as a time interval from time t_n to t_{n+1}, and the traffic rate represents length of transmitted packets;

a second multiplier for multiplying an average traffic rate Tr[n] of the client port actually generated before time slot n and stored in the register 34 by a second multiplicator 1-g;

an adder for adding outputs from the first multiplier and the second multiplier, so as to obtain an average traffic rate of the client port before time slot n+1 as Tr[n + 1] = g*Tr Δ [n] + (1-g)*Tr[n];

the register provided for temporarily storing the average traffic rate Tr[n+1] of the client port generated before time slot n+1; and

a comparator for comparing the average traffic rate Tr[n+1] of the client port generated before time slot n+1 and a bandwidth threshold Tr_pre of the client port, and if Tr[n+1] is smaller than Tr_pre, the client port being allowed to transmit packets.

2. The bandwidth control device as claim in claim 1, wherein the register is a flip-flop.

3. The bandwidth control device as claim in claim 1, wherein, after being compared by the comparator, if Tr[n+1] is larger than

Tr_pre, the packet uncapable of being transmitted is stored in a packet memory of the network switch.

4. The bandwidth control device as claim in claim 1, wherein the client's port is connected to a 10Base-T or a 100Base-T Ethernet.

5. The bandwidth control device as claim in claim 1, wherein the uplink port is connected to a 100Base-T or a 1000Base-T Ethernet.

6. A bandwidth control method for a network switch having a plurality of client ports and at least one uplink port to switch packets among the client ports and the uplink port, each client port having a predefined bandwidth threshold, the method comprising the steps of:

(A) initializing a traffic rate $Tr\Delta[n]$ of a client port in time time slot n to 0, where the time slot n is defined as a time interval from time t_n to t_{n+1}, and the traffic rate represents length of transmitted packets;

(B) determining whether there is a packet to be transmitted, and if yes, calculating an average traffic rate of the client port generated before time slot n+1 as $Tr[n+1]=g*Tr\Delta[n] + (1-g)*Tr[n]$, where $g<1$ and Tr[n] is an average traffic rate actually generated before time slot n;

(C) determining whether the average traffic rate Tr[n+1] of the client port generated before time slot n+1 is larger than a bandwidth threshold Tr_pre of the client port, and if no, transmitting the packet; and

(D) updating the traffic rate TrΔ[n] in time slot n as TrΔ[n] = TrΔ[n]+ packet length, updating the average traffic rate Tr[n+1] generated before time slot n+1 as Tr[n + 1] = g*TrΔ[n] + (1-g)*Tr[n], determining whether to enter into a next time slot, and if no, executing step (B).

[6.]7.(Amended) The bandwidth control method as claim in claim 6, wherein in step (D), when entering into the next time slot, there are performed n=n+1 and Tr[n]=g*TrΔ [n-1]+(1-g)*Tr[n-1], and then step (A) is executed.

[7.]8.(Amended) The bandwidth control method as claim in claim 6, wherein in step (B), if there is no packet to be transmitted, it is determined whether to enter into a next time slot, and if no, step (B) is executed.

[8.]9.(Amended) The bandwidth control method as claim in claim [7]8, wherein, when entering into the next time slot, there are performed n=n+1 and Tr[n]=g*TrΔ [n-1]+(1-g)*Tr[n-1], and then step (A) is executed.

[9.]10.(Amended) The bandwidth control method as claim in claim [1]6, wherein in step (C), if the average traffic rate Tr[n+1] generated before time slot n+1 is larger than a bandwidth threshold Tr_pre of the client port, it is determined whether to enter into a next time slot, and if no, it waits for the next time slot.

[10.]11.(Amended) The bandwidth control method as claim in claim [9]10, wherein, when entering into the next time slot, there are performed n=n+1 and Tr[n]=g*TrΔ [n-1]+(1-g)*Tr[n-1], and then step (A) is executed.